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RED-CLOVER SEED PRODUCTION IN THE INTERMOUNTAIN STATES

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U.S. DEPARTMENT OF AGRICULTURE

As a result of studies and observations on red-clover seed production in the Intermountain States, the following summary briefly suggests practices that may aid farmers in successfully producing red-clover seed in that area.

Sow only weed-free seed originating from a stock known for its merit in the eastern red-clover belt.

The seed bed should be firm, and the seed should be sown early in the spring at from 10 to 15 pounds per acre.

As a companion crop with the clover, a grain with short, stiff straws, sown at from one-half to two-thirds the normal rate, is considered best.

Irrigate for the best development of the clover rather than for that of the small grain, in order to secure a good stand of clover. The clover plants should have plenty of soil moisture at the time the grain crop is harvested.

The crop may be lightly grazed, or a hay crop may be taken if it is desired to utilize the clover in late summer of the seeding year. Do not cut a crop of hay or closely graze the plants in the early fall.

Irrigate during the harvest year to produce rapid, vigorous growth. The last irrigation before harvesting should be applied when the red-clover plants are approximately one-half in bloom.

Early cutting for hay or grazing the first growth and harvesting the second growth for seed are the best means of controlling injurious insects affecting the seed.

Introducing hives of honeybees into or near the fields at the time when red clover is in full bloom will increase cross-pollination and consequently increase the yield of seed. A lack of cross-pollination at this time will result in a small yield of seed.

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RED-CLOVER SEED PRODUCTION IN THE INTERMOUNTAIN STATES

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Need and Opportunity for Domestic Seed Production

During the 10 fiscal years 1923–1932 the yearly importation of red-clover seed of foreign origin into the United States averaged 7,943,790 pounds, although imports appear to be declining. This foreign seed is not adapted to the seed-consuming section of the Clover Belt and, no matter what the quantity, should be replaced with adapted North American seed. At present most of the domestic red-clover seed is produced in the Corn Belt States, and while not enough is produced there to supply the need for adapted seed, it is believed that no increase in seed production in the Corn Belt is practicable under present conditions and methods of farming.

In those sections of the Intermountain States where red clover can be grown there is an excellent opportunity for profitably producing red-clover seed. In most cases bulky crops grown in this region have to be transported long distances to the place of consumption or of shipment, and this lowers their net value. Because of its smaller bulk and higher unit value, red-clover seed can be marketed more profitably under long-haul conditions than can staple crops such as hay or grain.

In many of the older irrigated sections where the supply of organic matter in the soil has been depleted, red clover has corrected this deficiency and in short rotations has materially increased the yields of the crops that follow, such as potatoes, beans, and sugar beets. The first growth of red clover during the harvest year is often grazed by sheep and the second cutting is harvested for seed, the clover thus providing early grazing as well as producing a cash crop. In addition, the straw that remains from the seed harvest supplies good roughage. While there are many legumes that may serve one or more of these purposes, red clover is probably better suited than any other to serve them all.

Areas Where Seed Production May be Increased

With the exception of those sections in Oregon and Washington that lie west of the Cascade Mountains, red-clover seed production in the Northwestern States is largely confined to land under irrigation, although on a few plateaus not under irrigation and receiving an average yearly rainfall of 17 to 25 inches, red-clover seed has been produced under special row culture. The east and west boundaries of this intermountain area extend from the river valleys at the base of the eastern slope of the Rocky Mountains to the Cascade Mountains on the Pacific coast. (Fig. 1.) In this region red-clover seed has been produced as far north as northern Montana and as far south as the southern part of Colorado. Nevada and the northern part of California offer the least possibilities and are not included

in the area in which red-clover seed production may be increased economically. While red-clover seed may be produced in the Intermountain States outside the arbitrary boundaries given, and while

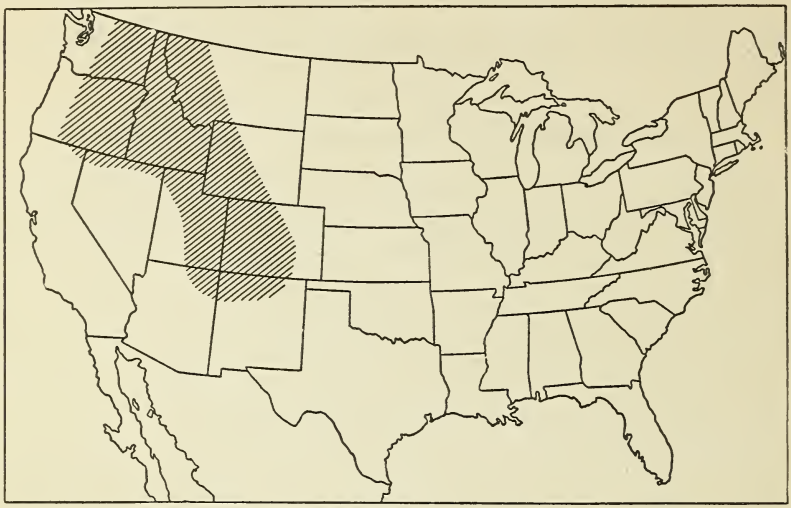

FIGURE 1.—Map showing general area (shaded) in which red-clover seed may be satisfactorily grown

even within the area described there may be irrigated valleys unsuitable for the purpose, it is believed that in general the area outlined offers unique opportunities for the development of a profitable industry.

Planting Stock

In selecting seed for planting stock, the pedigree or history of the seed and its freedom from weed seed are most important. Red-clover seed produced in the West must be of a quality acceptable in the consuming East and must be adapted to eastern conditions. While the quality depends on appearance, freedom from weed seed, and high germination, the source of the stock is the more important element. Foreign or unadapted American stock must be avoided, and no seed save that from sources known to be adapted to the northeastern and Corn Belt sections of the United States should be used. If farmers persist in using undesirable seed for planting stock they will soon find that the seed they have for sale is discriminated against by the eastern growers.

State crop-improvement and seed associations can supply the names of persons or firms from whom adapted seed stocks may be purchased.

Seeding

In all irrigated sections where there is sufficient water, it is advisable to seed the clover with a companion crop. This is done to provide a grain or feed crop and to prevent weeds from developing and smothering the young clover plants. In nonirrigated sections having a limited rainfall it is of course necessary, in order to secure good stands, to sow in rows without a companion crop. Red clover should be planted on a firm seed bed whether sown with a fall or

spring seeded companion crop or alone. In order to prevent extreme competition with the clover, the companion crop should be a grain with short, stiff straws and should be seeded at a slightly reduced rate. The preferred rate of seeding for clover is from 10 to 15 pounds per acre, although good stands may be obtained by sowing as little as 6 to 8 pounds per acre. It is believed that the use of the extra seed above the low rate of seeding is insurance for securing a good stand. If seeded alone in rows under dry-land conditions, 2 to 5 pounds of seed will suffice.

Inoculation and Fertilizers

Observations throughout this region indicate that it is not necessary to inoculate the seed before planting.

While many of the soils in the irrigated valleys do not need lime, phosphate, or potash fertilizers, the older sections have shown benefits from the application of phosphate fertilizers. Wherever any deficiencies exist it is of course necessary that they be corrected before satisfactory results may be expected.

Treatment the First Year

When red clover is grown under irrigation with a companion crop it is important to irrigate when the young clover needs water, rather than at a time most beneficial to the grain crop. The number of irrigations and the quantity of water applied depend on the rainfall and the temperature to which the seedlings are exposed; as a rule, three to five irrigations will be necessary the first year. The early irrigations may be applied advantageously when the seed is sown, again a month or more later, and immediately before the harvesting of the small grain. Neglecting this last irrigation often causes poor stands.

After the removal of the grain crop the clover plants should be irrigated throughout the summer as often as necessary for good growth. The clover must not go into the winter in a dry condition. Pasturing heavily or cutting a crop of hay in early fall may cause winterkilling of the plants. In a few sections in the southern part of the region described, a small crop of seed is often harvested in the fall of the year in which the clover is seeded.

Treatment the Second Year

During the spring red clover should be given ample moisture to produce vigorous growth, but the number of irrigations will depend upon the amount of effective rainfall. The first crop may be utilized in any of several ways: It may be grazed, cut for hay, or cut for seed. The individual grower must decide the best use. If the clover is grazed, it is advisable to pasture lightly (fig. 2), removing the animals during the first part of June, after which the clover should be clipped in order to produce uniform blooming during the second growth. If the clover is cut for hay, the cutting should be done earlier than usual; that is, when the clover is about one-third to one-half in bloom. This earlier cutting will favor a rapid and vigorous development of the second growth and will also control some of the insects that are injurious to seed production. Whether it is advisable to cut the first crop for seed may depend upon the prevalence of pollinating

insects, such as bumblebees and honeybees, the interference with the harvesting of other crops, and the need for hay or pasturage.

If the first crop is to be harvested for seed, the last irrigation of the first growth should be made when the plants are approximately one-half in bloom, and the maturing heads should be examined from

FIGURE 2.—Sheep grazing red clover after removal of the small-grain crop

time to time to determine the best time for cutting in order to secure the greatest number of well-filled, mature heads. If a sufficient number of pollinating insects are prevalent throughout the blooming period, the time of cutting will probably depend upon the time of maturity of the greatest number of heads. Cutting the crop too

early will yield a large number of immature, shriveled seeds, while cutting too late will result in shattering and loss. Cutting and windrowing the seed crop when the plants are wet with dew will help to prevent shattering. While the seed may be hulled from the windrow, the most common practice is to stack the crop until a more convenient time, the latter practice being preferred if a hulling machine is not immediately available. In order to start rapid development of the second growth, the field should be heavily irrigated as soon as possible after the first crop is removed. The second growth may be handled like the first.

The seed may be hulled with a clover huller or a grain separator equipped with hulling attachment, and in some sections the combine has been used successfully. Many farmers have found it profitable to run the straw through the machine a second time, especially if a grain separator or a poorly adjusted huller has been used.

Pollinating Insects

The dependence of seed setting on the number and activity of honeybees and bumblebees is not realized by most farmers who grow red-clover seed. The red-clover flower is practically self-sterile; that is, the pollen of a flower will not fertilize any other flower on any head of the same plant. Therefore, before fertilization can occur, it is necessary that the pollen be transferred between flowers on different plants. This cross-pollination is done principally by honeybees, bumblebees, and other kinds of bees, whose presence in large numbers at the time red clover is blooming is essential for large yields of seed. If other nectar and pollen producing plants more liked by the bees than red clover are available, the honeybees in particular will work the other plants in preference to the red-clover flowers. If only the second growth is saved for seed, the time of cutting the first growth may be regulated so that the second growth will be in full bloom when other flowering plants are scarce and when large numbers of bees are present. There is reason to believe that in sections where an increase in acreage has been accompanied by declining yields of seed, the introduction of additional colonies of honeybees would prove profitable. Bumblebee nests should not be destroyed, and every effort should be made to provide desirable nesting places for queen bumblebees.

Insects Injurious to Seed

There are many insects that are injurious to red clover and thus indirectly cause lower yields, although not directly affecting the development of the seed. There are, however, two insects that especially damage the seed crop, namely, the chalcid fly and the midge. Recognizing their presence and making the first cutting not later than the time when the clover is one-half in bloom will materially reduce infestation by these two insects. Where the practice of cutting two seed crops in one year is followed, heavy infestations of both insects may cause such serious injury that seed return will become unprofitable. In order to destroy the overwintering larvae, it is advisable to rotate the clover fields, allowing the clover to occupy a field for only one harvest year. Such practice will not only control the insects but will do much toward improving the fertility of the soil.

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